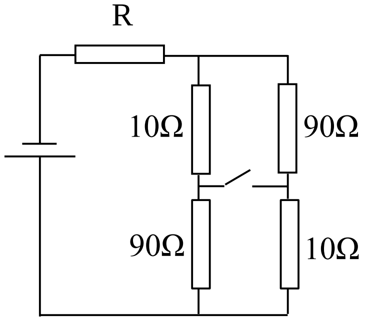
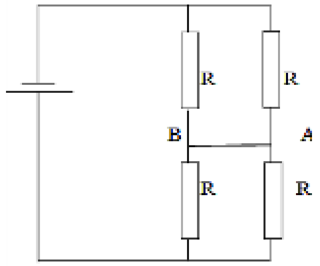
Physics Questions
3rd Year Secondary School



(1) **In the opposite circuit:** When the key “K” is closed, the equivalent resistance of the circuit decreases by half its original value. Calculate the value of the resistance “R” knowing that the internal resistance is neglected.

(2) The circuit in the figure, you have got four resistors.



Firstly: What happens (when wire is connected between A and B) to each of …?

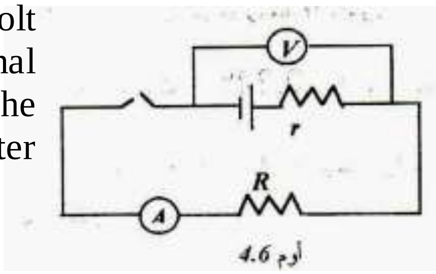
1- The current intensity of the source.
2- The current intensity in each resistor.
3- The potential difference across each resistor.

Secondly: What is the value of the current intensity in the wire AB?

(3) Write down the equivalent units for each of the following. Then mention the physical quantity measured by each.

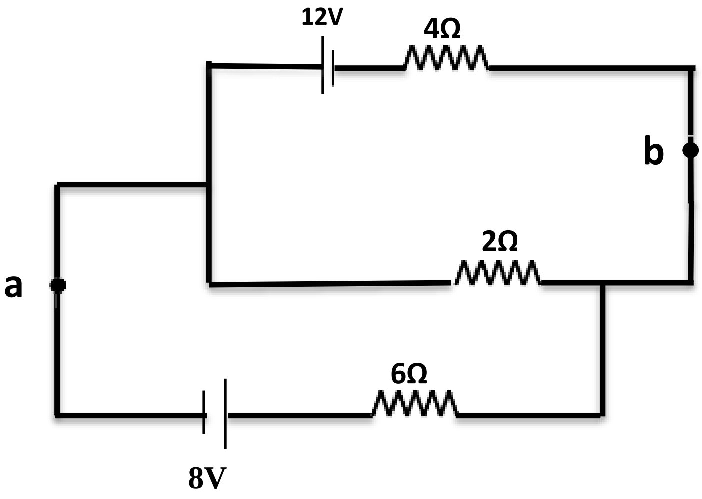
a) Volt Ampere. Second b) Joule / ohm. Coulomb.

(4) The circuit shown in the figure consists of a 12 Volt battery with internal resistance 0.4 Ω, an external resistor of resistance 4.6Ω and a switch, determine the reading of the voltmeter (assuming that the voltmeter resistance is infinite):



1- when the switch is open.
2- when the switch is closed.

(5) In the shown figure, find the current intensity passing in the resistance 2 Ω, and the potential difference between a and b.



(6) Three parallel resistors, the resistance of one of them = 1 Ω. The equivalent resistance of these resistors is …

1- less than 1
2- greater than 1
3- equal to 1

(7) If length of a wire is doubled, its specific resistance …

A- Increases to double B- Decreases to half C- remains the same

(8) Two parallel straight wires A and B, have normal distance between them in air = 30cm. A current of 2 Ampere passes in wire A, and a current of 3 Ampere in wire B. Find the position of the neutral point in the following two cases.

1- When the currents pass in the same direction.

2 When the currents pass in the opposite directions.

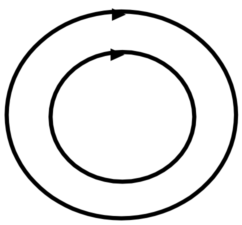
(9) A straight wire of diameter 2mm carries a current of 5Amp. Find the magnetic flux density at a distance 0.2m from the wire axis.

(10) A current intensity of 4 Amp. passes through a straight wire that produces magnetic flux density at a point away from its axis = 2 $X10^{-5}$ T find the distance (d) between the point and the wire.

(11) State the parameters on which the magnetic flux density at a point on the axis of current-carrying solenoid depends.

(12) What is magnetic flux density at the center of a circular loop of diameter 12cm, that carries a current of 5Ampere. If the length of the wire of which the coil is made = 50m. [$\mu = 4\Pi \times 10^{-7}$ Wb/Amp.meter]

(13) In the opposite figure, the magnetic flux density at the common center …

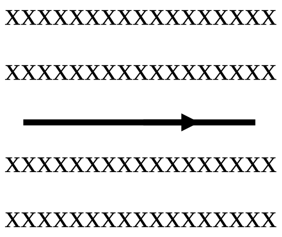


a) $B_1 - B_2$
b) $B_1 + B_2$
c) $B_1 \times B_2$
d) Zero

14) Compare between Ampere's right hand rule and right hand screw rule. (in view of uses).

15) Explain, what happens to the magnetic flux density at a point inside a solenoid on its axis and its self-inductance when its number of turns increases to double without changing the coil dimensions or the currant intensity passing through it.

16) In the figure, by using Fleming's left hand rule, determine the direction of motion of the wire when a current passes through it.



17) A rectangular loop of cross sectional area $50m^2$, and 100 turns carries a current of 1.2 Amp. and placed in a magnetic field of flux density 5T. Find the torque acting on the loop, when the loop plane:

a. is parallel to the field.
b. is $\perp$ to the field.
c. makes an angle 20^o with the flux lines.

18) Compare between the types of magnetic force between two parallel wires carrying electric currents when flow in the same direction, and flow in opposite directions.

19) Explain how the moving coil galvanometer is modified to be used as a voltmeter.

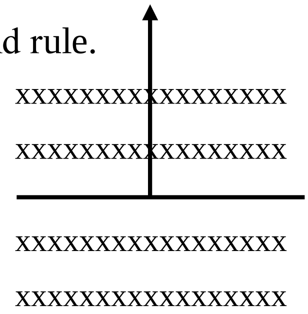
20) What are the factors on which the induced e.m.f in a coil depends in Faraday's experiments?

21) When the number of turns in a coil moving in magnetic field increases three times its value, the induced emf generated in the coil will…

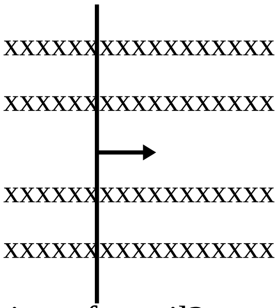
a. Increase to the double   b. Decrease to half.
b. Increase three times its value.

22) Compare the uses of Lenz's rule and Fleming's right hand rule.

23) In the opposite figure, wire (ab) is moved in magnetic field is shown in the figure, determine the direction of the current induced in the wire if it is a part of a closed circuit.



24) Determine the direction of the current generated in the wire if it is a part of a closed circuit, if it is moved in a magnetic field as shown in the opposite figure.



25) What are the factors affecting the coefficient of self-induction of a coil?

26) A rod of copper of length 30cm moves at a velocity 0.5m/s in a direction perpendicular to a magnetic field of density 0.8 Tesla. Calculate the emf induced across this rod.

27) A wire of length 0.5m moves $\perp$ to a magnetic field of density 0.4T at velocity 20m/s. If the wire is a part of a closed circuit of total resistance 6Ω, find the current intensity passing through the wire.

28) What are the modifications applied to the A.C generator to render it a unidirectional generator?

29) What happens when the two slip rings are replaced by two insulated metal halves of commutator in the dynamo?

30) Compare between the step up and the step down transformer (in view of the number of turns in the primary and secondary coils.)

31) A transformer changes the voltage from 220V to 17.6V and the ratio of its turns is 10:1. Find the transformer efficiency.

32) Compare between the roles of spiral springs in the galvanometer and the two insulated halves of the metallic cylinder in the electric motor.

33) The direction of the AC current is reversed once each…

a. $\frac{1}{4}$ cycle b. $\frac{1}{2}$ cycle c. complete cycle.

34) Give Reason for: Scale of hot wire ammeter is non uniform.

35) What happens to the inductive reactance of a coil when the frequency of AC current is doubled?

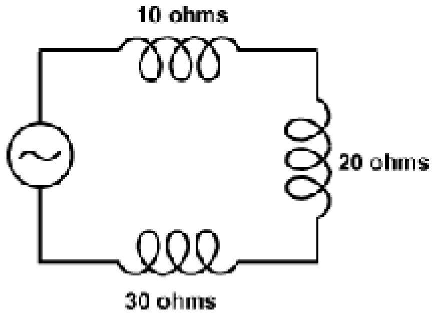
36) In an AC circuit that contains a pure inductor, ...

a. The current lags the voltage by 90.
b. The current leads the voltage by 90.
c. The current lags the voltage by 45.
d. The current and the voltage are in phase.

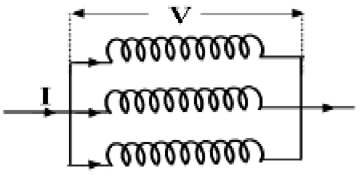
37) In the opposite figure, the coils are connected with A.C source of effective emf = 120V and υ = 60Hz. Calculate.

1- The total self-inductance of the coils.

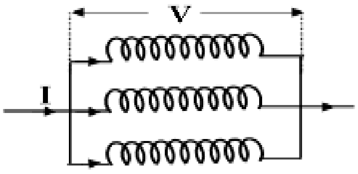
2- The current intensity of the source.



38) In the opposite figure, what happens to the current intensity (I) when another inductive coil (has no resistance) is connected in parallel with the other coils?



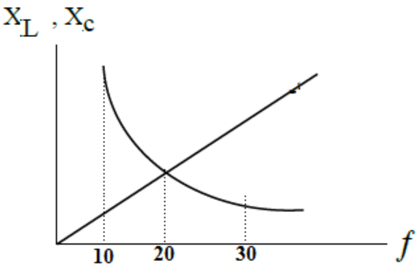
39) In the opposite figure, the inductive reactance of the three coils are the same, what happens to current intensity in the upper inductive coil if a soft iron rod is inserted inside it?



40) Three capacitors of capacities 20, 80, 40 μF respectively are connected in series to an AC supply 100 Volt, and υ = 50Hz. Find the current intensity through the circuit.

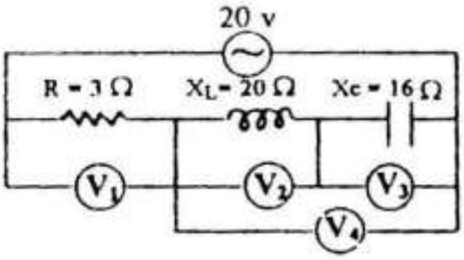
41) Using the opposite figure, describe the behavior of the circuit if the frequency of A.C source equals each of:

a. 10 Hz
b. 20 Hz
c. 30 Hz



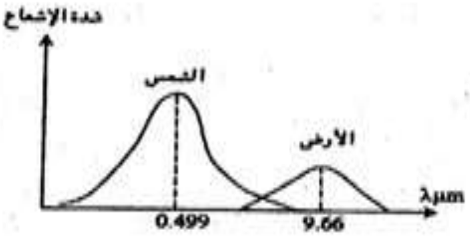
42) In the electric circuit shown in figure, calculate:

1- The circuit impedance.
2- The total current in the circuit.
3- The reading of each voltmeter.



43) In opposite curve represents the relation between radiation intensity and wavelength emitted from hot bodies knowing that the temperature of the sun surface = 6000K calculate.

A- The average temperature of the earth's surface.
B- The wavelength of radiation emitted from a black metallic container that is filled with boiling water.



44) Give Reason: The black body is considered as a perfect emitter.

45) What happens, when light of high intensity falls on a metallic surface, but its υ is less than υ_c (critical frequency) of the surface?

46) In a photoelectric emission experiment, a metal surface in an evacuated tube was illuminated by a monochromatic light of υ greater than the critical one for such metal. What happens to the maximum Kinetic energy of the emitted photoelectrons from the metallic surface in these cases?

a. Light intensity of incident rays are doubled.
b. Increasing the exposing time to the double.
c. Increasing the frequency of incident light to the double.

47) Energy needed to emit electrons from a metal surface = 4 $x10^{-19}$J. Which monochromatic light can free electrons from this metal surface given that the wavelengths of these lights are 6200Å, 5000Å, 3100Å respectively? Find the maximum KE of the freed electrons. (h = 6.6 $x10^{-34}$ J.s).

48) What are the results expected due to the collision between a photon of high energy like x-ray photon and a free electron at rest?

49) Calculate the frequency of a green light photon, its mass and its momentum if its wave length = 5000Å

50) Give reasons: The electron microscope has highly resolving power.

51) What happens to the resolving power of the electron microscope if the potential difference between the cathode and the anode increases?

52) Give Reason: Lyman's series in hydrogen spectrum has the highest energy of all other series.

53) Calculate the radius of the 2^{nd} energy shell in the hydrogen atom knowing that the wave length associating the electron in this shell 6.644 Å.

54) Calculate the longest and the shortest wavelengths in the spectrum of hydrogen atoms in Lyman's series knowing that: $E_n = \frac{-13.6}{n^2}$ eV

55) An X-ray tube operates at voltage of 25 KV and a current beam of 30mA with an efficiency of 2% calculate:

1- The minimum wavelength of the x-ray produced.
2- The electrical energy used by the tube each second.
3- The heat produced per second at the target.

h = 6.6 $x10^{-34}$ J.s, $m_e = 9.1 \times 10^{-31}$ kg, $c = 3 \times 10^8$ m/s, $e^- = 1.6 \times 10^{-19}$ C

56) Give reason: The spectrum due to stimulated emission is considered always as line spectrum.

57) The monochromatic light means …

a. high frequency | b. one wavelength
c. Polarized | d. Keep constant phase difference.

58) In any atomic or molecular system, when the number or atoms or molecules in the higher energy levels is greater than number of atoms in the lower levels, this is called population inversion.

59) The strength of chemical bonds in a substance (between the atoms of its molecules) plays an important role in its electrical conductivity.

60) The electrons in a good conducting material are considered free and bounded at the same time. (Explain this statement).

61) Give Reasons For:

A- The electronic devices are affected by high temperatures.

B- Semiconductors are used in making the thermostat of cooling units in cars.

C- The concentration of +ve holes and –ve free electrons always equal in pure semiconductors and not equal in impure semiconductors.

62) Explain the formation of the diffusion current in pn junction (Diode) although it is not connected to an external source.

63) Probability of having +ve output from AND gate, that has two inputs, one of them is connected to the output of NOT gate is ...

a- one b- two c- three d- four

64) Number of probabilities of zero output from OR gate that has four inputs …

a- one b- two c- three d- four

65) Number of digits on which all logic gates are operating is …

a- one b- two c- three d- four.